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GEOGRAPHIC MOVEMENT OF MILITARY PERSONNEL:
ISSUES AND POLICIES

John T. Warner
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John T. Warner
Stanley A. Horowitz, *Project Leader*

October 1991

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PREFACE

This paper was prepared by the Institute for Defense Analyses (IDA) for the Office of the Assistant Secretary of Defense (Force Management and Personnel (OASD (FM&P))), under contract MDA 903 89 C 0003, Task Order T-L7-798, issued 15 March 1990. The objective of the task was to identify promising approaches to maintaining strong military manpower capability during a period of declining budgets and force levels. This is one of a total of seven papers to be published. Each of the seven papers covers a specific area of military manpower management: the proper experience mix, personnel movement, the timing of training, lateral entry, the link between career progression and assumption of management responsibilities, individual training methods, and increased use of simulators for training. The topic of this paper is personnel movement.

This work was reviewed by Waynard C. Devers and William T. Mayfield of IDA and by Harry J. Gilman, an IDA consultant.

CONTENTS

Preface	iii
I. Introduction and Summary	1
II. Reasons for Movement and the Policies Governing It.....	3
A. Reasons	3
B. Data on Movement Frequency and Costs	4
C. Current Policies.....	8
1. DoD Directive 1315.7.....	8
2. Service Policies.....	9
D. Policy History	10
E. Tour Length Outcomes	11
III. Policy Issues.....	15
A. A Framework for Understanding the Issues	15
B. Productivity	17
1. Frequency of Movement and Individual Job Performance.....	17
2. Frequency of Movement and Unit Performance.....	19
C. Career Development	19
D. Assignments, Tour Lengths, Morale, and Retention	20
E. Compensation Incentives	21
1. Sea Pay.....	22
2. The Overseas Tour Extension Incentive Program	23
F. Other Assignment Systems	25
IV. Policy Directions.....	27
V. Future Efforts	29
References	31
Abbreviations	Abb-1

FIGURES

1. Average Number of Moves Made by Officers.....	6
2. Average Number of Moves Made by Enlisted Personnel.....	7

TABLES

1. PCS Moves in FY 1989.....	4
2. Moves in FY 1989 as a Percentage of Begin-Strength,	5
3. Cost of PCS Moves in FY 1988.....	7
4. Average Completed Tour Length for Moves in FY 1989.....	12
5. OTEIP Data for FY 1986.....	23

I. INTRODUCTION AND SUMMARY

Policies governing the geographic movement of U.S. military personnel are a topic of ongoing concern within the Office of the Secretary of Defense (OSD), the uniformed services, and the Congress. Congressional interest in this topic derives primarily from the cost of personnel movement—in FY 1989 Permanent Change of Station (PCS) moves cost \$2.5 billion. Cost, however, is not the only issue; more frequent movement of personnel may impose a number of indirect costs such as degraded unit effectiveness. Yet policies that attempt to reduce movement might impose their own problems, such as less exposure to a variety of experiences and command opportunities. Although a number of studies have examined pieces of the problem (see References [1] through [4], for example), there exists no single, comprehensive discussion of DoD policies governing personnel movement and analysis of whether alternative policies might (in some sense) be better.

The purpose of this paper is to provide a start at such a discussion by: (1) documenting the current policies that govern personnel movement and how they came to be; (2) examining existing evidence regarding the links between the frequency of personnel movement and other factors, including personnel productivity, unit effectiveness, and retention; (3) investigating in what ways current policies might be changed and what the benefits (and costs) of such changes might be; and (4) determining areas where further analysis might bear fruit.

Our review of the existing evidence suggests that significant benefits would in fact accrue to reduced personnel movement and increased unit stability. However, the cost of gaining these benefits depends upon how reduced movement is implemented. The frequency of personnel movement is high primarily because of the large number of U.S. forces stationed abroad and at sea. The return of a large portion of U.S. forces stationed in Europe and elsewhere would enable the services, particularly the Army, to simultaneously increase tour lengths and reduce unit turbulence. It has the further advantage of reducing PCS costs. In addition, other benefits would accrue. One example is that the move to a larger force based in the continental United States (CONUS) would allow the Army to expand its Cohesion, Operations, Readiness, and Training (COHORT) system of

personnel replacement, a system which has certain advantages over the individual replacement system.

Unfortunately, in the absence of the return of a large portion of the U.S. forces stationed abroad, policy options for reducing personnel movement are rather limited and more costly. Given the current billet structure, reducing movement without adversely impacting morale and retention requires inducing personnel to voluntarily accept longer tours through improved compensation. The evidence is not entirely clear about whether there would be a net benefit to expanded use of compensation to reduce personnel movement; however, the Navy's experience with the expanded sea pay during the 1980s is encouraging.

The analysis herein points up several areas that require further study. One is how to plan for the move to a larger CONUS-based force and identification of problems that will inevitably arise during the transition period. Second, the link between the move to a larger CONUS-based force and expanded use of alternative manning systems like the Army's COHORT system also deserves more attention. Third, uncertainty regarding available evidence about the effects of compensation on voluntary extensions to overseas or sea duty requires that this area be studied further, something that could be done with available data. Finally, our review points out that the Office of the Secretary of Defense (OSD) needs a rotation policy analysis model, something that OSD does not now possess.

II. REASONS FOR MOVEMENT AND THE POLICIES GOVERNING IT

A. REASONS

The primary factor that determines personnel movement is the services' requirement to fill "spaces" or "billets." The need to move personnel to fill these spaces depends on a number of factors, the most important of which are the number of U.S. military installations and personnel turnover—separations and retirements. The larger the number of U.S. military installations, either within or outside of CONUS, the greater will be the need to move personnel to fill vacant spaces. A reduction in U.S. forces in the NATO countries would have dramatic effects on personnel movement, particularly in the Army and Air Force. A higher separation rate generates more vacant spaces and more movements to fill them.

Factors such as the geographic dispersion of military installations and personnel turnover rates are, to some extent, exogenous" determinants of personnel movement, i.e., determinants that are not immediately controllable by assignment policy. These factors give rise to a minimum below which movement is difficult to reduce. But as is explored in more detail below, much movement is policy-driven; in many instances the services have implemented policies aimed at reducing personnel movement, while in other instances they have implemented policies whose effect is to increase movement.

DoD currently recognizes six categories of moves: operational, rotational, training, unit, accession, and separation. Operational moves are moves from one CONUS space to another or from one overseas location to another that do not involve moves to or from CONUS military training establishments. Rotational moves are those from CONUS to overseas locations (excluding moves originating from CONUS training establishments) or moves from overseas locations back to CONUS. Training moves are moves to or from CONUS training establishments for periods of 20 weeks or more (except moves originating overseas). Training moves are those beyond the initial skill level. Accession moves include those to the basic training establishments and from there to initial assignments. Unit moves are movements of organized military units arising from such

factors as (non-TDY) unit deployments or geographic reassignment of the unit. Separation moves are self-explanatory.

The various categories of moves are interdependent. More separations may necessitate not only more accession moves, but also more training, operational, and rotational moves. But if it is unacceptable to military personnel, a policy that tries to reduce rotational or operational moves may ultimately cause an increase in separations, and moves due to separation and accession may therefore increase. A host of non-PCS policies—where to locate the training establishments, when to train personnel, the level of reenlistment bonuses or retirement benefits, etc.—affect movement.

B. DATA ON MOVEMENT FREQUENCY AND COSTS

Table 1 provides data by category and service on the number of PCS moves in FY 1989. Unit moves are negligible. Moves due to personnel turnover—accession and separation—account for between 47 percent (Air Force) and 56 percent (Navy) of all moves. Except for in the Navy, training moves represent only about 5 percent of all moves within a service. The two remaining move categories—operational and rotational—are substantial, representing between 32 percent (Navy) and 48 percent (Air Force) of all moves. Rotational moves—those overseas and back—are about one-third of moves in services other than the Navy. Operational moves are largest in the Navy because this category contains movement between sea and shore billets.

Table 1. PCS Moves in FY 1989

Type	Army	Navy	Air Force	Marine Corps
Accession	97,442 (23.3%)	85,462 (26.9%)	52,223 (22.2%)	30,456 (25.3%)
Separation	129,484 (31.0%)	93,032 (29.3%)	58,077 (24.6%)	28,829 (23.9%)
Training	20,100 (4.8%)	36,649 (11.5%)	12,207 (5.2%)	4,907 (4.1%)
Unit	0 (0.0%)	63 (0.1%)	428 (0.2%)	0 (0.0%)
Operational	41,229 (9.9%)	71,193 (22.4%)	25,419 (10.8%)	19,009 (15.8%)
Rotational	129,323 (31.0%)	31,143 (9.8%)	87,254 (37.0%)	37,384 (31.0%)
Total	417,598	317,542	235,608	120,585

Source: Defense Manpower Data Center.

Perhaps a more useful statistic to examine is the number of moves relative to the force level. Table 2 shows the number of moves in FY 1989 as a percentage of FY 1989 begin-strength. Data are shown separately for officers and enlisted personnel. The data reveal that the incidence of moves is generally greater for enlisted personnel than for officers. For instance, the Army experiences about 45 moves for every 100 officers and 56 moves for every 100 enlisted personnel. Only in the Air Force do officers move more frequently than enlisted personnel. The higher incidence of movement among enlisted personnel is due to their higher accession and separation rates. Army enlisted personnel, for example, have 32 accession and separation moves per 100 enlisted personnel versus only 15.6 per 100 officers. Across the services and between officers and enlisted personnel, the incidence of training, operational, rotational moves also varies considerably.

Table 2. Moves in FY 1989 as a Percentage of Begin-Strength

Type	Army	Navy	Air Force	Marine Corps
Officers				
Accession	6.5	7.5	7.1	13.5
Separation	9.1	5.9	8.9	9.8
Training	7.4	12.2	6.1	3.7
Operational	8.5	17.8	10.0	9.2
Rotational	13.9	8.2	11.2	5.9
Total	45.4	51.3	43.3	42.2
Enlisted				
Accession	13.8	15.6	9.7	15.9
Separation	18.2	17.3	10.6	15.3
Training	1.8	5.4	1.3	2.4
Operational	4.9	11.4	3.3	9.8
Rotational	17.4	4.9	16.3	20.5
Total	56.1	54.6	41.2	64.0

Source: Defense Manpower Data Center.

It is useful to place the extent of movement into historical perspective. In 1989 there were 1.09 million PCS moves. This number is down about 16 percent from the average number of moves reported for the years 1980-1986 and almost 30 percent from the mid-1970s (Reference [1], Table 1-2). Most of this reduction is due to fewer accession, separation, and unit moves. These reductions mirror the reductions in personnel turnover. Operational, rotational, and training moves, however, show little decline.

The extent of personnel movement over a career may be gleaned from Figures 1 and 2. The figures show the relationship between the average number of moves and years of

service (YOS).¹ Data for these figures are from the 1985 DoD Personnel Survey. Army officers, for example, report having made an average of 3 moves by the end of their first year of service. This average rises to 3.6 moves by 5 years, 6 by 10 years, 8.5 by 15 years, and 10 by 20 years and over. Although they move somewhat less frequently, the pattern for Army enlisted personnel is similar: after an average of 2.2 moves during the first year of service the average rises to 3 moves by 5 years, 5.1 by 10 years, 7 by 15 years, and 9 by 20 years and over.

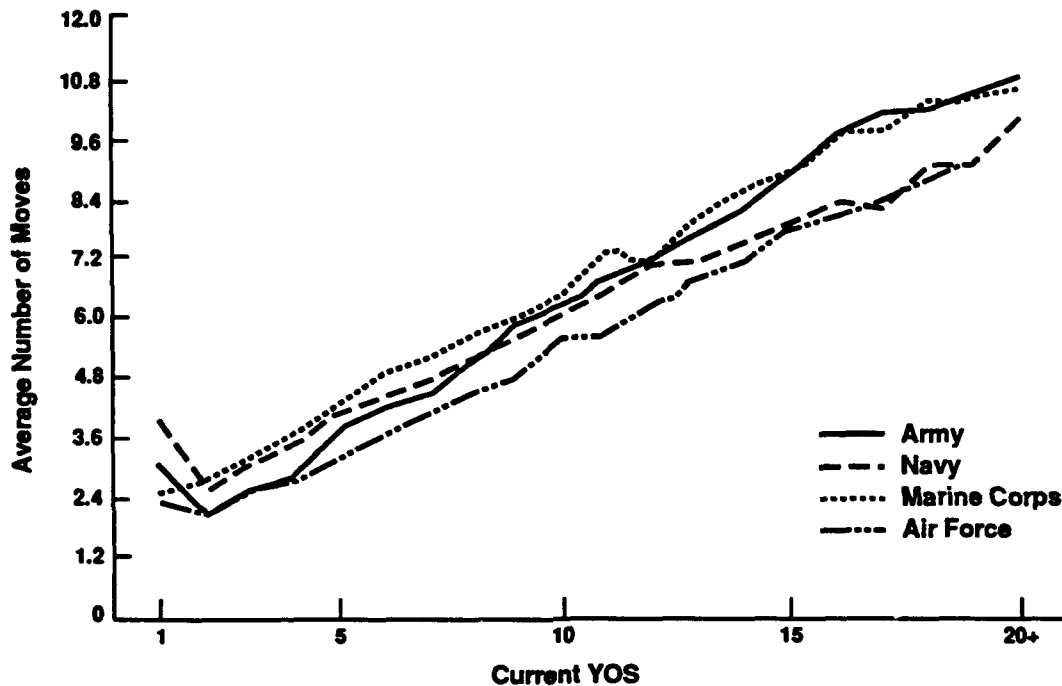


Figure 1. Average Number of Moves Made by Officers

These patterns are revealing. After a number of moves in the first year related to training, personnel tend to move less than one time in the next 4 years of service. That is, there appears to be an initial period of stability in geographic location. Thereafter, however, the frequency appears to pick up again. Between 5 and 10 years of service, for example, Army officers move an additional 2.4 times, implying an average of about two years at each location. Between 10 and 15 years, the average length of stay is also about 2 years. Among enlisted personnel, the differences across services are minimal until 10

¹ The survey asked about PCS changes, so the numbers in the figures presumably exclude reassignments that did not require a geographic relocation.

YOS. Among officers, Marine Corps officers appear to move the most and Air Force officers move the least. Table 3 shows the cost of PCS moves in FY 1988. As the table indicates, rotational moves are more expensive than other moves. Rotational moves are cheaper in the Army and Marine Corps because a larger percentage of the rotational moves of these services are unaccompanied moves and because a smaller percentage of the personnel being moved are officers.

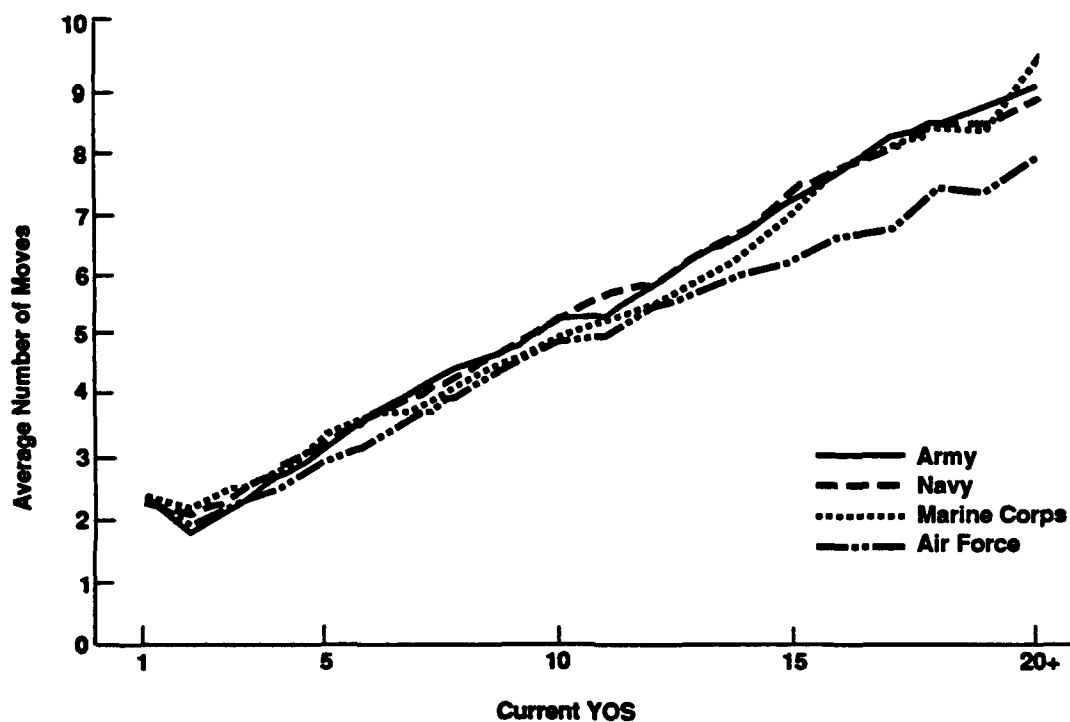


Figure 2. Average Number of Moves Made by Enlisted Personnel

Table 3. Cost of PCS Moves in FY 1988

	Average Cost (Thousands)		Total Cost (Millions)	
	Rotational	Other	Rotational	Other
Army	\$3.7	\$1.3	\$563.9	\$379.7
Navy	\$5.0	\$1.3	\$173.5	\$362.8
Air Force	\$5.3	\$2.0	\$447.9	\$330.6
Marine Corps	\$2.3	\$1.2	\$84.9	\$110.2

Source: OSD Comptroller.

C. CURRENT POLICIES

1. DoD Directive 1315.7

a. Criteria for Moves

DoD policies governing the assignment of personnel are set forth in DoD Directive 1315.7 (Reference [5]). The directive states that the primary consideration governing assignments is that they must fill basic skill requirements. Spaces or billets are usually identified by military occupational specialty (MOS) and paygrade. Spaces for entry grade personnel are obviously filled with personnel flowing out of the entry training pipelines. Since there is little lateral entry into the military services, other spaces are usually filled by reassignment. DoD policy is that individuals should not be moved from one space or billet to another if they do not possess the skills required to fill the vacant space.

Certain guidelines govern who among those qualified should be moved to fill a space. Starting with volunteers, the services are instructed to fill vacant spaces by transferring those members with the longest time on current station (TOS) who have satisfied their TOS requirements. Personnel are to be involuntarily reassigned only if volunteers cannot be found. Through officer paygrade O-5 and enlisted paygrade E-8, promotion cannot be the sole reason for reassignment prior to the completion of the individual's prescribed tour.

DoD policy attempts to reduce personnel movement by permitting individuals to extend beyond the prescribed tour in their current billets wherever possible, particularly those serving in overseas locations. This implies that the services are free to involuntarily reassign personnel only if a vacancy exists for which they qualify and no volunteers can be found to fill the vacancy.

When other factors are not overriding, PCS costs are supposed to be given "reasonable consideration" in deciding who to move.

b. Tour Lengths

With regard to establishing tour lengths, a major determinant of PCS costs, the guiding principle behind DoD Directive 1315.7 is fairness or equity, especially with respect to assignments overseas. Personnel should not be assigned to inordinately long tours in undesirable locations and everyone should share the burden of serving at undesirable locations at one time or another. To achieve equity, the directive establishes a norm of 36

months for accompanied tours overseas and 24 months for unaccompanied tours. Tours to less desirable locations are shorter (Reference [5], enclosure 3). The standard CONUS tour length is 3 years.

The policy directive permits a number of deviations from these standard tour lengths. For one, because the Navy could not adhere to the DoD directive and fill its sea billets, Navy personnel in sea-intensive ratings are exempted from the standard 3-year CONUS tour. For another, managers of major weapon systems acquisition programs are assigned to the program for either a minimum of 4 years or the completion of a major program milestone. Another exception is that assignment of general officers is normally for a period of 2 years; furthermore, assignments of general officers are not otherwise bound by the DoD directive. Finally, the directive specifies a number of circumstances under which other deviations from the usual tour lengths are permitted, including such factors as base closure, unit deactivation, and organizational changes.

2. Service Policies

The language in the services' policy directives is patterned after the basic DoD standard. Although they appear to adhere to DoD Directive 1315.7, they may spell out more specifically the criteria for reassignment or deal with service-specific issues.

a. Air Force

Air Force Regulation (AFR) 26-20 (Reference [6]) specifies that officers with the fewest dependents shall be selected for accompanied tours and that officers with no dependents shall be selected for locations with limited support facilities for dependents. Selection for overseas tours begins from among volunteers who have had at least 36 months at their current duty stations. If there are no volunteers, qualified individuals are then selected from among those currently serving in CONUS. As a general rule, officers who have been in CONUS the longest time are most likely to be sent abroad. AFR 39-11 (Reference [7]) tries to maintain equity in overseas assignments of enlisted personnel by: maintaining an interval of at least 24 months between involuntary short tours, with a desired goal of 36 months; requiring, at most, two involuntary short tours in a 20-year career; and requiring, at most, 8 years outside of CONUS during a 20-year career.

b. Army

Because a larger fraction of the Army's force serves overseas, Army personnel are assured shorter intervals in CONUS between overseas tours. Army policy, set forth in Army Regulation (AR) 600-30 (Reference [8]), sets a goal of 24-month CONUS tours, but guarantees only 12 months in CONUS between overseas assignments. Army policy for enlisted personnel also tries to alternate overseas tours between long and short tours and to retain soldiers at an installation as long as possible.

Officer assignment policy is set forth in AR 614-100 and AR 614-185 (References [9] and [10]). Officer assignments are made to balance two objectives, professional career progression and equity in geographical location.

c. Navy

Navy rotation policy deals mostly with the problem of sea-shore rotation. Office of the Chief of Naval Operations (OPNAV) Instruction 1300.15 (Reference [11]) guides the movement of personnel between eight categories of duty: (1) shore, (2) sea, (3) overseas shore, (4) non-rotated sea, (5) neutral, (6) preferred overseas shore, (7) partial sea, and (8) double sea. Categories 2 through 4, 7, and 8 count as sea duty, while category 5 counts as sea duty only if it immediately follows assignment in one of the other sea codes.

The lengths of time Navy enlisted personnel are assigned to sea and shore billets varies by rating. Nominally, Navy policy is to achieve a sea-shore rotation ratio of 3:3 in all enlisted ratings (e.g., 3 years of sea duty for each 3 years of shore duty). However, this policy is in practice not achievable. In the majority of Navy ratings, the ratio of sea to shore billets is in excess of 1:1. The Navy-wide average for paygrades E-5 and above is about 3.8:3. Many Navy ratings are now classified as "deprived" (sea-shore billet ratios of between 4:3 and 5:3) or "extremely deprived" (ratios above 5:3).

D. POLICY HISTORY

The evolution of DoD PCS policies is described in some detail in Reference [1]. Briefly, DoD Directive 1315.7 was first promulgated in 1957. Prior to that time, the services set their own policies without guidance from DoD. Over the years, the DoD directive has been modified six times—1958, 1963, 1974, 1977, 1985, and 1987—to arrive at the current set of policies. The 1958 directive called for standard tour lengths overseas for all services and set the normal overseas tour length at 36 months, with shorter tours at less desirable locations. The 1963 directive made qualifications to perform a job

the primary criterion for selecting personnel for assignment outside of CONUS. The 1970 version emphasized family stability as an objective of PCS policy.

The 1974 version established a minimum 2-year tour in CONUS and increased some overseas accompanied tours to 48 months, an increase that was later reversed. A January 1977 version imposed a minimum 3-year tour for CONUS assignments and established new policies regarding the assignment of first-term personnel. After objections from the services, a new version promulgated in December of 1977 retained the minimum 3-year CONUS tour but permitted some exceptions (e.g., Navy personnel in sea-intensive ratings). It also set some new policies, including no more than one assignment for 3-year enlistees and two for 4-year enlistees, establishment of "homebasing" as a objective, and the minimum 2-year tour for general officers. The 1985 version changed tour lengths at 19 overseas locations, apparently in response to House Armed Services Committee inquiries into overseas tour lengths.

As noted earlier, DoD policy is to encourage personnel assigned overseas to extend their tours wherever possible. Several policies are designed to encourage voluntary extensions. One is the Overseas Tour Extension Incentive Program (OTEIP), which was first implemented in 1980. This program offers those who have successfully completed their assigned overseas tours the following incentives for a 1-year extension: (a) \$960, (b) 30 days of paid leave, (c) 15 days paid leave and round-trip air fare to the nearest CONUS port of entry. Eligibility for OTEIP benefits is restricted to personnel serving in MOSs that have substantial overseas requirements. The Consecutive Overseas Tour (COT) program offers personnel currently serving overseas their choice of assignment if they move to another overseas billet. This program is potentially useful because it reduces the number of moves required to fill a vacancy (Reference [1]).

E. TOUR LENGTH OUTCOMES

Having reviewed the policies governing tour lengths, it is useful to compare actual completed tour lengths (CTLs) with prescribed tour lengths (PTLs). Such comparisons reveal the extent to which the services are adhering to DoD tour-length policies, and they also reveal some interesting differences across the services. To keep the comparisons manageable, we focus on those who were in enlisted paygrades E4-E6 or officer paygrades O4-O6 and who had PTLs of 24 or 36 months. Data are also displayed by type of move—operational (O) and rotational (R)—and by geographic origin of the move—CONUS, outside of CONUS. For each of these categories, Table 4 shows the average CTL for

those who made a move in FY 1989. For the most part, these averages are based on large numbers of moves; dashes indicate no moves in the given category during FY 1989.

Table 4. Average Completed Tour Length for Moves in FY 1989

Origin	Type ^a	PTL	Army	Navy	AF	MC	DoD
Enlisted (E4-E6)							
CONUS	O	24	24	—	—	25	24
		36	23	34	46	34	33
CONUS	R	24	29	—	—	31	28
		36	29	34	45	33	35
Outside CONUS	O	24	21	23	31	—	22
		36	28	33	39	—	30
Outside CONUS	R	24	25	24	34	23	24
		36	35	36	43	33	36
Officer (O4-O6)							
CONUS	O	24	35	24	—	—	27
		36	36	32	42	31	37
CONUS	R	24	31	24	—	—	28
		36	36	31	36	—	33
Outside CONUS	O	24	23	24	26	—	24
		36	27	26	39	38	33
Outside CONUS	R	24	28	25	27	26	28
		36	37	31	37	32	36

Source: Defense Manpower Data Center.

^a "O" stands for "operational" and "R" stands for "rotational."

Army personnel stationed in CONUS who are in grades E4-E6 and who are being moved for operational reasons served about 24 months in their previous assignment regardless of whether their PTL was 24 or 36 months. Likewise, similar personnel who were being moved for rotational reasons served about 29 months in their previous assignments, again regardless of whether their PTL was 24 or 36 months. Although it is not surprising that Army personnel moved from CONUS for rotational reasons do not serve the notional 3-year CONUS tour prescribed by DoD policy, it is surprising that personnel rotated for operational reasons, which entail moves within CONUS, do not serve the full PTL. Similar statements may be made about overseas operational moves. The failure of personnel making operational moves to serve their full PTLs is a departure from DoD policy that may warrant further investigation.

Importantly, personnel stationed overseas who are moved for rotational reasons tend to complete their PTL prior to being moved. There is no problem on average of failure to complete prescribed overseas tour lengths.

Also note the differences across the services. Regardless of whether they were stationed in CONUS or overseas prior to the move, Air Force personnel tend, on average, to serve longer than their PTL. Navy tour lengths are generally shorter than the PTL.

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III. POLICY ISSUES

Current PCS policies are the outgrowth of an evolutionary process. Discussions with those in DoD and the services who are responsible for PCS policy reveal a general satisfaction with current practices. The feeling seems to be that the PCS system "works," at least in the sense that it is well-understood and accepted, functions reasonably smoothly, and does not cause problems for other parts of the personnel system (e.g., personnel retention). Those policymakers have expressed a hesitation to implement major changes in policy for fear of the effect they would have on morale, retention, and other factors.

Nevertheless, it is reasonable to ask whether the DoD moves people too frequently, and whether some policy changes could reduce personnel movement whose benefits would exceed their costs. In this section, we develop a simple framework for discussing the policy issues, and explore the issues and the empirical evidence regarding the links between the frequency of personnel movement and other factors, including productivity, career development, and morale and retention.

A. A FRAMEWORK FOR UNDERSTANDING THE ISSUES

The following stylized (and highly simplified) model helps illustrate the relationships between the frequency of personnel movement, tour lengths, billet requirements, and other factors.² For simplicity, assume that there are three kinds of moves: rotational, accession, and separation. To model rotational moves, suppose that there are N_c CONUS billets and N_o overseas (or, in the case of the Navy, sea duty) billets to be filled. Let F_c be the number of personnel who move each year from CONUS to overseas and F_o be the number returning from overseas. Let t_c and t_o denote the CONUS and overseas tour lengths, respectively. Assuming that all billets are filled, the numbers moving in a given year will be $F_c = N_c/t_c$ and $F_o = N_o/t_o$. The numbers moving vary inversely with tour lengths.

² This "stylized" model does not adequately describe the processes in the various services by which manpower requirements are derived and personnel are distributed, but it was not meant to.

In equilibrium, the numbers moving to and from overseas are equal; that is, $F_c = F_o$. From this we derive that the number of overseas billets is

$$N_o = \frac{t_o}{t_c} N_c.$$

This equation can be viewed several ways. If there are N_c CONUS billets, the number of overseas billets that can be sustained is $(t_o/t_c) N_c$. Thus, a policy of equal CONUS and overseas tour lengths would require an equivalent number of CONUS and overseas billets. If overseas tour lengths are twice the CONUS tour lengths, there needs to be only half as many CONUS billets as overseas billets.

The model suggests that a given billet structure can be sustained by an infinite number of alternative actual tour lengths; all that is required is that the billet ratio be equal to the ratio of tour lengths. Changing tour lengths changes the rotation flows F_c and F_o .³ This model could be modified to allow for differences in the billet requirements for and tour lengths of first-termers and careerists, but the qualitative implications would remain the same.

The total force is $N = N_c + N_o$. The number of separation moves is $S = bN$, where b is the separation rate. Separations create a need for accessions where, in equilibrium, $S = A$. The number of accession moves, A , is aN/m , where m is manyears per accession and a is the number of moves required for an accession to enter an operational billet. The number of accession and training moves is thus $(a/m + b)N$.

This model provides a framework for understanding the services' rotation policies and their accompanying problems. For instance, in many Navy ratings the bulk of the billet requirements are aboard ship; that is, N_o/N_c exceeds one. The Navy's priority is the full manning of sea billets (N_o). But the full manning of sea billets requires relatively long sea tours and relatively short shore tours; i.e., a high t_o/t_c ratio. On the other hand, any reduction in the length of sea tours (t_o) would require that the Navy provide more shore billets for those rotating from sea duty. Thus, the Navy's goal of a 3:3 rotation policy would require a substantial increase in both the number of shore billets and the inventory of personnel in sea-intensive Navy ratings.

³ In reality, shortening tour lengths may increase total billet requirements by increasing the number of personnel in the transient account.

A similar problem exists in many Army MOSs. Thirty-six percent of Army enlisted personnel are stationed abroad, and personnel requirements in many Army MOSs exist mainly in Europe.⁴ Any attempt to reduce tour lengths abroad would either require that the Army maintain a larger inventory of personnel in CONUS to provide an adequate rotation base or that it reduce CONUS tour lengths.⁵ However, the severity of the Army's rotation problems will be dramatically reduced after the planned reduction of forces in Europe.

B. PRODUCTIVITY

One of the fundamental issues regarding the frequency of personnel movement is the effect that such movement has on military productivity and readiness. There are three related questions here. First, how does frequent movement affect an individual's performance on a particular assignment or in a particular billet? Second, given that so many military tasks are team-oriented, how does more frequent personnel turnover of personnel affect unit readiness? Third, even if it were found to harm individual productivity or unit readiness, are there ways in which frequent movement might in fact contribute to better overall readiness?

1. Frequency of Movement and Individual Job Performance

On the first question, the economic theory of human capital suggests that productivity increases (but at a decreasing rate) with experience in doing a job or task. Some human capital is general: skills learned on one job are fully transferrable to other jobs. In this case, productivity does not diminish when individuals change jobs. Other human capital is specific: the skills learned in one job cannot be transferred to other jobs. In this case, productivity may diminish when job changes occur and individuals require a learning period before becoming fully productive in their new jobs.

If we think of each military assignment or billet as a different job, the key issue here is the extent to which skills that are acquired on one assignment are transferrable to other assignments. To the extent that skills are assignment-specific, a learning period on the new assignment will be necessary for individuals to achieve the same productivity as someone else who has the same total military experience, but more time in the current assignment. If

⁴ The Army defines an MOS to be "space-imbalanced" if more than 55 percent of its billets are located overseas.

⁵ Consequently, although the Army's stated goal is a 2-year CONUS tour for each overseas tour, the Army actually guarantees only a 1-year CONUS tour for each overseas tour.

skills are in fact assignment-specific, more frequent movement will tend to diminish an individual's performance on a given assignment and therefore detract from overall military effectiveness.

Accountability incentives is another reason to expect that more frequent rotation diminishes job performance. The more frequently personnel are moved, the less accountable they will be for the future consequences of current decisions they make or actions they take while serving in a given assignment. DoD policy explicitly recognizes the accountability problem in the case of major weapon systems program managers; it may well be a problem elsewhere.

The one factor that tempers the expectation that longer assignments improve productivity or job performance is that excessively long assignments to arduous duty jobs or jobs in undesirable locations may adversely affect job performance as well as retention at these locations.

Only a handful of studies have attempted to estimate on-the-job learning curves for military personnel. Kostiuk and Follman (Reference [12]) analyzed the productivity of Naval Reserve recruiters. Their study is instructive because the output is well-defined and can be quantitatively measured, and because recruiter productivity is mostly individual, not team, productivity. They found that (1) among younger recruiters, productivity grows about 67 percent in the first year of recruiting duty and roughly doubles by the third year of recruiting duty, (2) productivity falls, however, just prior to reassignment, and (3) more senior recruiters are immediately more productive than younger recruiters but their productivity does not grow as rapidly with respect to time on recruiting duty. Their results suggest that a significant amount of learning on the job is required before individuals become fully productive in their tasks; however, most of the learning occurs in the first year on the job. Yet recruiting duty is a relatively well-defined task; the time required to achieve a given productivity gain may be longer in more complex assignments.

The second study that estimates the effect of assignment-specific experience was conducted by Quester, Beland, and Mulligan (Reference [13]). These authors estimate the effects of a host of factors on the operational readiness of three classes of Navy destroyers. One important factor is the length of time the commanding officer has been assigned to the ship. For at least one class of ships, they found that the longer the commanding officer has been with the ship, the better is the ship's operational readiness.

2. Frequency of Movement and Unit Performance

A second reason for believing that personnel movement affects readiness lies in the fact that much military activity is team-oriented. More frequent personnel turnover diminishes unit effectiveness not only because higher turnover directly diminishes teamwork but also because it requires that more time be devoted to continually orienting and supervising new additions to the unit.

Several studies have attempted to estimate the effect of personnel movement on unit effectiveness. The previously mentioned study of readiness of Navy destroyers (Reference [13]) included an analysis of the effect of enlisted crew turnover on readiness. In 1988, the crew turnover rate was approximately 40 percent per year (which was down from almost 50 percent in the early 1980s). They found crew turnover to be significantly negatively related to readiness: a 1-percentage point decrease in the new crew rate in the quarter prior to a deployment (from a sample mean of 11.8 percent) is estimated to increase the probability that the ship is fully ready at deployment by .02 (from a sample mean of .82 to .84). Importantly, turnover of personnel in grades E-5 and above has a greater impact on readiness than turnover in the lower grades, suggesting that continuity of personnel is especially important in supervisory positions.⁶

Scribner, Smith, and Baldwin (Reference [15]) examined the performance of a large number of Army tank crews on a standardized test range in Germany during January-June 1984. The score of the crew was significantly related to how long both the tank crew commander and the gunner had been with the crew. They found that a doubling of these crew members' time with the unit (from about 7 to 14 months on average) would increase the tank's test score by about 4 percent, an effect that is small quantitatively albeit statistically significant.

C. CAREER DEVELOPMENT

The above arguments notwithstanding, many in the services believe that in some circumstances more frequent rotation, especially among officers, enhances effectiveness over the long run even when it detracts currently from individual job performance or unit

⁶ This is an important finding because turnover of higher grade personnel is more likely to be affected by assignment policy than turnover of junior personnel. Much of the turnover of junior personnel is due to separations resulting from attrition and expiration of enlistments, which cannot be controlled by rotation policy. Marcus (Reference 14) finds that three-fourths of the turnover among careerists is due to normal rotation rather than separation from service.

effectiveness. For example, the evidence from Quester, Beland, and Mulligan indicates that the relatively short ship command tours for Navy officers detract from ship readiness. But the policy of providing a larger number of officers with (short periods of) command experience is believed to contribute to the Navy's mission in two ways: (1) it provides more information to promotion boards about which officers should be promoted to the senior ranks and (2) the policy may improve mobilization capabilities by providing a larger pool of officers trained for command. The latter point suggests that what is inefficient in a strictly peacetime environment may contribute importantly to wartime capabilities.

D. ASSIGNMENTS, TOUR LENGTHS, MORALE, AND RETENTION

In addition to the desire to rotate personnel frequently for the purpose of career development, the other important impediment to longer tour lengths is the effect that longer assignments, particularly those in arduous billets or less desirable locations, would have on morale and retention. DoD and service policies that attempt to limit the extent of overseas duty, and the Navy's attempts to reduce sea duty, are predicated on the belief that morale and retention would suffer if the extent of service in arduous duty billets or undesirable locations were increased.⁷

To some extent this belief is supported by the existing empirical evidence. Studies of Navy enlisted retention, for instance, have found that a greater fraction of time spent in sea duty reduces retention (Reference [16]). Within the Army, personnel in the skill-imbalanced MOSs apparently have higher first-term attrition rates and lower first-term retention rates than personnel in other MOSs.⁸ An Army study conducted in the late 1970s found the attrition of first-termers to be positively related to the length of the initial tour to Europe (Reference [17]).⁹ The better retention rates of Air Force personnel than Army personnel are consistent with the fact that Air Force personnel generally spend a larger fraction of their time in CONUS.

⁷ In the context of the above stylized model, increasing t_o relative to t_c without increasing compensation for service in overseas billets would increase b , the separation rate, thereby driving up separation, accession, and training moves.

⁸ One Army memorandum discussing the skill-imbalanced MOS problem argued that the Army had assigned as many non-MOS-specific CONUS billets as possible to skill-imbalanced MOSs, including recruiter and drill instructor. Unfortunately, many of these CONUS assignments are themselves stressful and tend to exacerbate retention problems in the skill-imbalanced MOSs.

⁹ In response to this study, in 1980 the maximum 2-year European tour for first-term Army enlisted personnel was set at 18 months. However, in 1986 the maximum first-term overseas tour length was increased to 24 months.

Yet this research and the anecdotal evidence leave several questions unanswered. For one, the evidence does not make clear whether it is assignment in arduous billets or undesirable locations or just frequent rotation that adversely affects retention. Even when rotation is between comparable billets or locations, more frequent movement is likely to adversely affect retention. One reason is that more frequent rotation hampers the employment and earnings prospects of military spouses.¹⁰ Another is that personnel may not like the family disruptions that accompany frequent moves.

It is likely that much of the adverse morale and retention impact of assignment policy may come from the family separations that accompany certain assignments (e.g., sea duty) rather than to the arduousness of the duty or the undesirability of the location. For example, the historically low retention of enlisted Marine personnel may be traced in part to the fact that much of their overseas duty has been on 1-year unaccompanied tours to East Asia.¹¹

If the frequency of rotation and the family separations that accompany movement in fact adversely affect retention, a general increase in tour lengths might, for a number of personnel, be viewed positively and have a beneficial impact on morale and retention. This would be particularly true if overseas tours are accompanied and if DoD undertakes to design policies to improve spouse employment opportunities.¹² The fact still remains, however, that the prospect of longer assignments in certain billets could hurt morale and retention.

E. COMPENSATION INCENTIVES

Given the results from the previous subsection, it would seem natural to use compensation to offset the adverse effects of longer service in undesirable billets or locations. But attitudes toward doing so have varied over time (Reference [1], pp. 2-17 to 2-18). From 1901 to 1922, enlisted personnel serving in certain overseas locations received a 20-percent premium over their normal pay and officers received 10 percent. These pay premiums, called Foreign Duty Pay (FDP), were repealed in 1922 but reinstated

¹⁰ One recent study estimates that, compared with a policy of rotating personnel every 6 years, a 3-year rotation policy reduces the earnings of military wives by as much as 40 percent (Reference [18]).

¹¹ The Marine Corps recently implemented a Unit Deployment Program under which Fleet Marine Force units homeported in CONUS or Hawaii are deployed to the Western Pacific at 6-month intervals.

¹² In fact, DoD policy is to make overseas tours accompanied tours wherever possible. See Reference [3] for a discussion of the overseas tours program and an evaluation of a congressional proposal to reduce the number of accompanied tours abroad.

in 1942. FDP was paid for service at any location outside of CONUS. In 1949 the FDP for enlisted personnel was scaled back to 10 percent of basic pay and FDP for officers was eliminated. The 1949 law also set sea pay rates for Navy enlisted personnel equal to the FDP rates. In 1963 eligibility for receipt of FDP was restricted. Relabelled Certain Places Pay (CPP), it is currently paid only to personnel serving at a limited number of "truly arduous" overseas locations. However, Navy enlisted personnel still receive sea pay, and OTEIP, implemented in 1980, provides some compensation for some personnel serving overseas who extend for 1 full year beyond their normal prescribed tour.

This brief review is instructive because it indicates that during certain times compensation for service in arduous assignments has been considerably more generous than in the programs that DoD currently has in place. Would an expansion of these programs to the more generous benefit levels that have prevailed historically encourage personnel to accept or to stay longer in hard-to-fill billets? Would an expansion be cost-effective?

1. Sea Pay

The sea pay program provides Navy enlisted personnel varying amounts of sea pay based on cumulative years of sea duty. In addition, a \$100 per month "kicker" is provided to personnel who have currently served in more than 3 years in a sea billet. A number of studies have examined the sea duty problem. They are reviewed by Cooke (Reference [19]). The focus of these studies has been the effect on retention of sea duty and compensation, including both sea pay and reenlistment bonuses. The consensus estimate is that a 10-percent increase in the extent of sea duty in the next term of service reduces Navy first-term enlisted retention by about 3.5 percent. Consequently, the first-term retention rate will be about 10 percent lower in ratings that spend 4 out of every 6 years at sea compared with ratings that spend 3 out of every 6 years at sea.

The impact of sea pay on retention has been hard to establish for the reason that sea pay rates have not varied much historically and, despite a sizeable increase in 1980, still comprise only a small proportion of Basic Military Compensation (BMC). The only study that has attempted to estimate the effect of sea pay was by Radtke (Reference [20]), whose results were, on the whole, not very precise. The effects of reenlistment bonuses have been estimated much more precisely. The adverse effect of a 10-percent increase in the extent of sea duty could be overcome by a one to two multiple increase in the Selective

Reenlistment Bonus (SRB), which translates to a pay increase of about 6 to 12 percent over the horizon of a reenlistment.

To date, no studies of sea pay have successfully analyzed the issue of whether the \$100 monthly increment in sea pay at 3 years of consecutive service has been effective in encouraging personnel to extend in sea billets. However, anecdotal evidence indicates that the Navy has had much less difficulty filling sea billets during the 1980s than it did during the late 1970s, when sea pay and reenlistment bonuses were considerably lower. Calculations by Goldberg (Reference [21]) and Warner and Goldberg (Reference [16]) indicate that the higher sea pay or reenlistment bonuses are a more cost-effective way of filling sea billets than by the increase in endstrength that would be required to provide the rotation base necessary to fully man sea billets without higher pay levels for sea-intensive skills.

2. The Overseas Tour Extension Incentive Program

The OTEIP is the primary compensation incentive offered to Army and Air Force enlisted personnel to extend overseas tours. A 1987 DoD report (Reference [3]) examined the OTEIP in some detail. Data from FY 1986 on the number of OTEIP participants, their participation as a percentage of those eligible to participate, and the frequency of options chosen are displayed in Table 5.

Table 5. OTEIP Data for FY 1986

Service	Number of Participants	Participation Rate	Frequency of: ^a		
			Option A	Option B	Option C
Army	1,883	7.4%	47%	44%	9%
Navy	5,273	29.3%	32%	53%	15%
Air Force	2,347	9.9%	37%	55%	8%
Marine Corps ^b	1,155	7.0%	27%	46%	27%

Source: Reference [3].

^a Option A is \$960, Option B is 30 days of paid leave, and Option C is 15 days of paid leave and round-trip air fare to the nearest CONUS port of entry.

^b Data for the period May-September FY 1986.

Participation in the OTEIP is low—with the exception of the Navy, less than 10 percent of the personnel eligible to receive OTEIP benefits receive them. According to the DoD study, this program provides a substantial "windfall" to program participants because many of them would have extended their overseas tours in the absence of the program. The report cites results of an econometric analysis of Air Force data, which

indicates that the OTEIP has increased overseas tour extensions by about 25 percent, suggesting a windfall rate of 75 percent.¹³ If this is so, at current benefit levels OTEIP induces only about two or three 1-year extensions for each 100 persons eligible to extend. The rather high windfall rate reduces the cost-effectiveness of the program. However, a detailed cost analysis provided in the DoD found that although the windfall rate is high, OTEIP has essentially no impact on the PCS budget. It saves just enough money in reduced frequency of PCS moves to pay the OTEIP benefits. The report concludes that "OTEIP has little potential for reducing PCS costs in expanded or alternative forms" (Reference [3], p. 18). However, the report recommends changing Option A from 12 monthly payments of \$80 to a single lump-sum of \$1,000 to be paid at the time the member extends on grounds that this change would "increase program participation and reduce the percentage of windfall participants at no additional cost to the government" (Reference [3], p. 19).

The econometric analysis of OTEIP probably overstates the windfall effect of the program. While the report never defines exactly what constitutes an extension, it apparently considers an extension any tour length in excess of the PTL. But many of the extensions that do not involve receipt of OTEIP benefits are likely to be for periods of less than 1 year. Because receipt of OTEIP benefits requires an extension of at least 1 year and therefore would not be paid to short extensions, it is likely that the windfall rate estimated by the study is overstated and, consequently, that the savings in PCS costs are understated. Even if it is cost-neutral, OTEIP is beneficial because it does increase the number of personnel willing to extend for longer overseas tours. Longer overseas tours save money by reducing the number of CONUS billets required for rotational purposes. Furthermore, by avoiding the involuntary reassignment of personnel, the program is likely to have a positive (albeit perhaps small) effect on retention. However, further analysis is required to determine how many additional man-months of overseas service are actually purchased with this program.

¹³ The econometric method is described in the report, but actual parameter estimates and significance levels are not reported. Linear probability models were estimated with grouped data and with individual data. The proportion extending or a binary variable for extension is regressed on a number of independent variables, one of which is a dummy variable for whether the individual is in an occupation that is eligible for OTEIP benefits. The coefficient on this dummy is (apparently) interpreted as the change in the extension rate due to the existence of the program.

F. OTHER ASSIGNMENT SYSTEMS

The current assignment system is an individual replacement system. Within an individual replacement system, personnel stability and unit cohesion are achieved by increasing tour lengths. The one problem with this system is that even with longer tour lengths, individuals are continually entering and leaving units. Some unit resources are therefore being continually devoted to the training and orientation of new personnel.

The services have experimented from time to time with alternative replacement systems with the explicit goal of increasing unit cohesion and reducing the turbulence caused by continual turnover. The most recent Army effort to do so, begun in the early 1980s, is called the COHORT (Cohesion, Operations, Readiness, and Training) system. In this system, a number of Army units, mostly in infantry, artillery and armor, train together in CONUS for a given period of time (typically 18 months) and then deploy as a unit overseas for another period (again, typically 18 months). Turnover, especially among first-term personnel, would come mostly during the CONUS training phase, where it is less costly. When turnover does occur, "fillers" come into the unit in groups at discrete intervals, thereby reducing unit orientation and training requirements.¹⁴

According to Army evaluations, the COHORT program has had a positive effect on readiness in combat units. However, this improved readiness does not come without cost. The concept requires a fully trained and identically equipped unit be in CONUS for each unit deployed overseas. In some instances this configuration of forces is achievable with current resources; in many other instances, however, such a configuration could be achieved only with a significant increase in endstrength and equipment, both of which would be costly. Consequently, given the current structure of CONUS and overseas billets, it is unlikely that the concept could be generally expanded as an alternative to an individual replacement system. However, with a Conventional Forces in Europe (CFE) agreement and the return of large numbers of personnel from Europe, the COHORT concept may become viable for a wider range of Army units.

¹⁴ The Navy is currently evaluating a concept similar to COHORT. In this concept, a ship's crew would be rotated to the ship at the same time, say, just after overhaul. Gains would be had because the crew members would go through initial training exercises together and because there would be less movement of personnel on and off of the ship during deployment. Marcus (Reference 14) discusses some of the difficulties with this idea.

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IV. POLICY DIRECTIONS

From examining the data and from reading previous work, we have learned that a significant portion of personnel movement and, consequently, DoD's PCS budget, is driven by exogenous factors and is therefore not directly controllable by policy. Operational and rotational moves can, to some extent, be affected by policy. Initiatives that reduce the extent of movement for these reasons would probably be desirable. The preponderance of evidence cited above suggests that reducing operational and rotational moves would improve readiness.

However, there are no easy solutions. Over the past decade, DoD has implemented a number of policy initiatives aimed at reducing personnel movement (Reference [1], Chapter 8), including minimum retainability for reassignment, mandatory accompanied-by-dependents tour lengths for military couples when both are assigned to the same area, and implementation of the OTEIP. These changes have had marginal effects on tour lengths. Without significant changes in the billet structure, the personnel inventory, or enhanced pecuniary incentives, it is unlikely that the capacity exists to substantially increase tour lengths without causing morale and retention problems.

The use of pecuniary incentives to induce voluntary choice of arduous assignments remains small. Sea pay has not been changed since 1980. The 1987 DoD review panel of the OTEIP was reluctant to recommend increases in OTEIP amounts, in part on grounds that insufficient evidence exists about its effects to justify an increase. Nevertheless, as a portion of compensation, inducements to accept arduous duty assignments are smaller now than at many times in the past.

Targeted pecuniary incentives have two morale/retention advantages over standard rotation patterns, which are avoidable only by separation from service. First, they induce individuals to reveal their willingness to accept longer overseas (or sea duty) assignments. Second, even if reduced PCS costs only offset the cost of higher pecuniary incentives, there will be gains from improved retention and personnel productivity brought about by reduced personnel movement. There appears to be room to increase these incentives without driving up manpower costs: even at the rather high "windfall rates" estimated in the 1987 study, OTEIP cost increases would almost be balanced by PCS cost reductions, with

the benefit of longer overseas tours. The same comments may be made about sea pay, whose amounts should at least be pegged to the pay scale to prevent erosion over time of relative sea pay amounts.

As previously noted, the whole problem of personnel movement may solve itself. At the end of FY 1989, almost 500,000 persons, 22 percent of the U.S. military force, were stationed abroad. Thirty-five percent of Army personnel were overseas. Current plans call for the return of as many as 200,000 troops from Europe. This would reduce to only 13 percent the portion of U.S. forces stationed abroad. Such a change would enable the Army and the Air Force, the services principally affected, to significantly increase CONUS tour lengths and probably tour lengths outside CONUS as well.¹⁵

By reducing substantially the number of PCS moves, the move to a larger CONUS-based force would directly save PCS costs.¹⁶ Furthermore, because it reduces the need for personnel abroad so severely, a larger CONUS-based force might obviate the need to use pay incentives to voluntarily induce longer overseas tours. The Navy's rotation problem, however, will not be much improved; it will continue to be the service with the most severe rotation problem and the service to which pecuniary incentives will need to be targeted to encourage longer service in arduous duty positions.

¹⁵ This discussion, of course, ignores recent events in the Middle East.

¹⁶ A rough guess is that the PCS budget could be reduced by as much as one-third, or almost \$1 billion per year.

V. FUTURE EFFORTS

Many questions remain concerning appropriate rotation policies for the post-Cold War world. Additional analyses should be designed to address them, as outlined below.

1. Because of concerns expressed about the econometric analysis underlying the 1987 DoD review of the OTEIP, another econometric analysis might prove fruitful. Studies of the effectiveness of sea pay in inducing sailors to voluntarily extend in sea billets have also been proposed several times in the past; to date, however, there has been no successful analysis of this question.

2. If the arguments of this paper are correct, many benefits would derive from the personnel stability brought about by a larger CONUS-based force. In addition to improved productivity and higher retention, the reduced need to provide a CONUS rotation base for active-duty personnel might permit the transfer of many functions from the active forces to the reserves (Reference [22]). One area of future work is the identification of active-duty billets that will no longer be needed solely for rotation purposes and of functions that could be transferred to the reserves.

3. Transition problems will also be brought about by the return of forces from Europe, including where to locate them and the need for expanded housing and other support facilities at CONUS locations. Even over the longer run, the stability gained by the return of forces from Europe may be a mixed blessing. Very long tours in undesirable U.S. locations may hamper morale, recruiting, and retention. Some rotation will be necessary for career progression. Planning for the return of troops from Europe and problems that will be encountered should be a high priority in future work.

4. One benefit of the return of forces from overseas is the potential for expanded use of assignment systems other than the individual replacement system. Analysis of where and how to expand would be useful.

5. Development of PCS policy analysis model. One of the objectives of our analysis was to use currently existing models to obtain quantitative estimates of the costs and benefits of various policy alternatives wherever possible. This has not proved possible because models that would provide quantitative answers do not currently exist. Black, Hogan, Davis, and Simmons (Reference [4]) provide a description of the models that do

exist and call them primitive. Models were built to provide forecasts of PCS costs for given values of billet requirements, personnel inventories, tour lengths, retention, and other factors. For the most part, the models do not allow analysis of the interdependencies among the various policy variables. Efforts to develop a policy analysis model might prove fruitful. Indeed, two efforts to do so, one for the Air Force (Reference [4]) and one for the Navy (Reference [23]), are currently under way. Such a model could possibly be developed for DoD use.

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ABBREVIATIONS

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AFR	Air Force Regulation
AR	Army Regulation
BMC	Basic Military Compensation
CFE	Conventional Forces in Europe
COHORT	Cohesion, Operations, Readiness, and Training
CONUS	continental United States
COT	Consecutive Overseas Tour
CPP	Certain Places Pay
CTL	completed tour lengths
DoD	Department of Defense
FDP	Foreign Duty Pay
IDA	Institute for Defense Analyses
MOS	military occupational specialty
NATO	North Atlantic Treaty Organization
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
OTEIP	Overseas Tour Extension Incentive Program
PCS	Permanent Change of Station
PTL	prescribed tour lengths
SRB	Selective Reenlistment Bonus
TOS	time on station
YOS	years of service